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U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
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EXECUTIVE SUMMARY

This report reviews the economic status of the 1988 Washington, Oregon, and California pink shrimp fishery. Pink shrimp (Pandalus jordani) are distributed along the entire West Coast, with the center of abundance found off Oregon. The individual states manage the pink shrimp fishery using season, gear, and size regulations. The fishery is exclusively commercial and stocks are exploited by single-rig and double-rig otter trawl vessels that may also fish for groundfish, crab, salmon, and albacore throughout the year.

Data on landings, exvessel values, and fleet size were supplied by state agencies. Statistics are tabulated to summarize changes in economic conditions between 1987 and 1988. General indicators of fleet economic performance are provided using the measure average gross revenue per vessel from West Coast marine fish landings. General conditions in the market sector are reviewed by examining data on the value of domestic processed shrimp products and the quantity of shrimp products imported into U.S. markets.

Landings in the West Coast pink shrimp fishery improved for the fourth consecutive year in 1988. Coastwide production was 71.4 million pounds, equaling the third highest total landings of pink shrimp in history, and 4 percent higher than in 1987. Landings were significantly higher in California and Washington, but declined somewhat in Oregon, although Oregon's production was still the fourth largest ever recorded. Small-grade shrimp were a problem early in the season; however, the grade of shrimp improved considerably during the course of the season.

Due to lengthy price negotiations, vessel tie-ups, and high shrimp inventories, the exvessel value of pink shrimp landings dropped sharply in 1988. Landings were valued at $29.1 million, down 37 percent from 1987, because coastwide exvessel prices fell to an average of $0.41 per pound compared to $0.68 per pound in 1987. Due to the proportionally large decline in exvessel values, average gross revenues decreased substantially for trawl vessels participating in the 1988 West Coast pink shrimp fishery.

The 1988 market for salad/cocktail shrimp was dominated almost entirely by West Coast pink shrimp production. Norwegian imports of frozen shrimp, which in past years was the primary competitor in West Coast shrimp markets, dropped to slightly over 712,000 pounds in 1988, compared to over 15.8 million pounds imported just four years ago in 1985. The average wholesale pink shrimp price paid to West Coast processors declined from $3.80 per pound in 1987 to about $2.70 per pound in 1988. Consequently, with pink shrimp supplies up marginally in 1988, processor revenue from the production of pink shrimp probably declined.

ECONOMIC STATUS OF THE WASHINGTON, OREGON AND CALIFORNIA PINK SHRIMP FISHERY IN 1988

I. Introduction

This is the third in a series of annual reports on the economic status of the Washington, Oregon, and California (West Coast) pink shrimp fishery. The economic status of the 1988 West Coast pink shrimp fishery is compared to the 1987 season in this year's report.

The West Coast pink shrimp population (Pandalus jordani) is thought to be one single stock (Pacific Fishery Management Council (PFMC) 1980). Pink shrimp range along the entire West Coast, but are generally most abundant off Oregon. The shrimp stock is divided into 10 subunits according to the physical separation of the shrimp beds, differences in the structure of the population (i.e. age composition), and differential growth rates. The state of Oregon uses the differences in growth characteristics to demarcate statistical areas as logical stock units for the shrimp population (Zirges, et al., 1982). Table 1 provides the names of the 10 population subunits and their associated Pacific Marine Fisheries Commission (PMFC) statistical areas.

The PFMC drafted a coastwide fishery management plan for the pink shrimp fishery in 1980; however, it was never implemented. Instead, the state fishery agencies adopted the recommended Federal regulations to manage pink shrimp as a uniform, coastwide stock in 1981. These include various season, gear, and size measures designed to permit and encourage domestic harvest of the optimum yield from the pink shrimp resource. The specific management measures are:

1) A coastwide closure from November 1 - March 31, with no provisions for in-season closures.

2) 1 3/8-inch minimum mesh size in the cod-end with no cod-end liners permitted.

3) Maximum average count of 160 shrimp per pound.

The West Coast shrimp stock is exploited primarily by commercial double-rig and single-rig otter trawl vessels. Reportedly some vessels in Oregon experimented with beam and midwater trawls in 1987, and this fishing practice continued during the 1988 season. For the most part, shrimp trawl vessels are multi-species, multi-purpose fishing operations; when not fishing for shrimp they may fish for groundfish, crab, salmon, or albacore. West Coast trawl vessels deliver pink shrimp exclusively to shore-based processing plants. There are no joint

venture, foreign, or recreational fisheries for pink shrimp on the West Coast.

II. Overview of the 1988 Season

West Coast pink shrimp landings were the third highest catch in history during 1988. The coastwide landed catch totaled 71.4 million pounds, or 4 percent greater than in 1987 and 69 percent above the 1978-1987 average catch of 20.1 million pounds (Table 2). This is the fourth consecutive year in which West Coast shrimp landings have increased and indicates that the production cycle has apparently returned to the peak levels seen in the late 1970's.

In Washington and California, pink shrimp landings increased 41 percent and 15 percent, respectively, in 1988 (Table 2). Washington's total was a new state record and California's was the third highest statewide catch ever recorded. Moreover, this marks the fifth consecutive year that landings have increased in California following the period of extremely depressed production during 1983-84. Despite the coastwide improvement in shrimp production, landings declined in Oregon by 6 percent; however, the total of 41.9 million pounds was still the fourth highest recorded for that state.

Due to a sharp drop in the average exvessel price of pink shrimp, the exvessel value of landings decreased significantly to $29.1 million, compared to $46.5 million in 1987 (Table 2). After adjusting for inflation (1986=1.00), the exvessel value of pink shrimp was $27.5 million in 1988, or 39 percent lower than in 1987. The average exvessel price fell to $0.408 per pound from the record annual average of $0.679 per pound paid in 1987. Several factors may have contributed to the lower exvessel price in 1988: (1) Processors began the season with high shrimp inventories remaining from the previous year; as a result, industry price negotiations were delayed at the start of the pink shrimp season; (2) fishing vessels remained tied up because processors were willing to pay only around $0.25-0.35 per pound for small shrimp which are normally most abundant early in the season,; (3) after several weeks of protracted negotiations, fishermen and processors eventually settled on a split pricing system of $0.50 per pound for shrimp larger than 140 count-per-pound, and $0.25 per pound for smaller shrimp. This aggreement was intended to reduce the incidence of landings of pin head shrimp which became a severe problem during the 1987 fishing season.

The size of pink shrimp improved during the course of the fishing season in most areas. Illegal shrimp landings over 160 count-per-pound were minimal because processors demanded a larger grade of shrimp and the size limit requirement was enforced more effectively, particularly in Oregon. Despite good winter growth

of one-year-old shrimp, most of the subunit areas yielded smaller shrimp than in 1987 (Table 3). In particular, pink shrimp grew faster in the northern areas (Destruction Island and Grays Harbor) than in southern areas off of Oregon and California. This is thought to be due to warmer water temperature which stimulate shrimp growth (P. Collier, CDFG , pers. comm.).

III. Harvesting Sector

The capacity of the shrimp trawl fleet fell slightly as there was a net loss of seven vessels in 1988. As reported by the state fishery agencies, a total of 236 trawl vessels landed pink shrimp, compared to 243 in 1987 (Table 4). The fleet contracted in all but the 60-to 69-foot vessel size class and declined for the first time in four years. Not surprisingly, there has been a strong correlation between the value of shrimp landings and participation in the fishery since 1985. This is characteristic of the pattern exhibited in open access fisheries, whereby the fleet expands when net profits are positive and shrinks when net profits are negative.

The extent of multi-state fishing activity by shrimp trawlers also decreased in 1988. A total of 70 vessels (30 percent) landed in more than one coastal state in 1988 , compared to 83 vessels (38 percent) in 1987 (Table 4). This may not be surprising given that pink shrimp production was near record levels and abundant concentrations of shrimp were reportedly located on all major shrimp beds along the coast. Thus, vessels need only make short trips from home port when viable concentrations of shrimp are present on local fishing grounds.

The change in the economic performance of the shrimp trawl fleet was evaluated using data from the Pacific Fishery Information Network research database (RDB). Fleet performance was measured using total gross revenues from all West Coast marine fish landings (shoreside, joint venture, and Puget Sound harvests landed in the three states) accruing to shrimp trawlers. This indicator is the most comprehensive measure of vessel performance available, since data on fishing costs used to compute vessel profit are not available. It does not, however, include other sources of revenue a shrimp trawl vessel may generate by fishing in different areas (i.e. Alaska) or from non-fishing activies such as tendering, charter services, leasing, or renting gear and vessels.

A complete list of trawl vessels landing pink shrimp was developed by matching the identification numbers of a state agency list of shrimp trawl vessels with vessels having recorded pink shrimp trawl landings in the RDB. The purpose of this comparison is to eliminate vessels which are not pink shrimp trawlers, but are listed as making one or more shrimp trawl landings due to gear coding errors. This procedure generated

matches for 239 vessels in 1987 and 234 pink shrimp trawl vessels in 1988. After adjusting for inflation (1986=1.00), pink shrimp trawlers earned a mean of $225,800 per vessel from West Coast marine fish landings, compared to $286,700 per vessel in 1987 (Table 5). Thus, average shrimp fleet revenues from all West Coast fishing activties declined 21 percent in 1988. Gross revenues fell an average of 27 percent for the 156 trawl vessels that were dependent on pink shrimp for their primary source of earnings in 1988. As a result, groundfish and Dungeness crab fisheries became more important to the fleet in 1988, with 30 percent of the fleet dependant on these complementary fisheries in contrast to 20 percent in 1987. Moreover, mean gross revenues were higher for the minority of shrimp vessels which relied on flatfish or crab fisheries for a larger share of their annual revenues. However, despite the generally improved value of Dungeness crab and flatfish fisheries, the fleet as a whole experienced generally poorer economic returns from West Coast fishing activities due to the extremely low exvessel prices paid for pink shrimp in 1988.

The economic performance of the shrimp trawl fleet is reported by vessel size class to analyze the variation in mean gross revenues. Without exception, all components of the fleet were negatively impacted by the sharp drop in shrimp prices during 1988 (Table 6). The decline in mean gross revenues was most significant for vessels in the 61-to 70-foot and over 80-foot size classes. It is possible for larger trawl vessels to fish for Alaskan pink shrimp to augment West Coast earnings; however, Alaskan pink shrimp landings remained very depressed at only 2.1 million pounds in 1988.

The concentration of the pink shrimp harvest was examined to indicate how shrimp production is distributed among the trawl fleet. Tables 7 and 8 show little difference in the degree of harvest concentration between 1987 and 1988. In each year the top 40 percent of the fleet harvested approximately 75 percent of the pink shrimp production. This indicates that a large number of vessels produce only small amounts of pink shrimp, with about 50 percent of the fleet accounting for less than 15 percent of the total shrimp output in each year.

IV. Processing and Market Sector

The National Marine Fisheries Service annually surveys processing plants on the West Coast (including Puget Sound) to determine the quantity and wholesale value of processed fish products and employment in the fish processing sector. This survey generates data points needed to compute wholesale prices that West Coast processors receive for shrimp products. The results of the annual processed products survey were used to (1) identify all plants which produced frozen, cooked and peeled shrimp, and (2) estimate a representative average wholesale price

based on each plant's production of this product form. This shrimp product is marketed domestically as individual quick frozen (IQF) shrimp. Therefore, the wholesale price of IQF shrimp derived for the processed products survey is taken as an index of the wholesale price of pink shrimp as a whole.

In 1988, West Coast IQF shrimp wholesaled at an average of about $2.70 per pound, compared to $3.80 per pound wholesale in 1987. The cause of this large decline is unknown, although at the start of the 1988 fishing season, West Coast processors reportedly had abnormally large inventories of shrimp that were unsold from the previous fishing year. Moreover, it is uncertain whether processor earnings were adversely impacted by the sharp fall in IQF wholesale prices. Given that pink shrimp supplies were up only slightly, it is feasible that the decline in shrimp values more than offset any increase in plant output resulting from shrimp production. In the case where a processing plant is primarily dependant on pink shrimp production for its earnings, gross revenues accruing from fish sales would be severely reduced. Most West Coast processing plants generate revenues from the production of many fish/shellfish products; therefore, they are largely insulated from the effects of a large decline in the value of production of one species.

West Coast pink shrimp competes in the market with Alaskan and Canadian pink shrimp and with IQF shrimp imported from Norway. The supply of West Coast pink shrimp was slightly higher because landings increased only 4 percent or 2.9 million pounds, although by historical standards shrimp production was near an all-time high in 1988. Alaskan and Canadian pink shrimp landings were essentially unchanged and remained very depressed in 1988 (Table 9). The supply of Norwegian IQF shrimp (peeled, other fresh and frozen) is no longer the major factor it was in the mid-1980's (Table 10). The total quantity of Norwegian peeled, other fresh and frozen shrimp entering U.S. ports fell substantially to just 712,700 pounds in 1988, down 82 percent from 4.04 million pounds imported in 1987. Just four years ago, Norwegian IQF imports totalled almost 16 million pounds. Thus, the increase in the West Coast pink shrimp supply was offset by a 3.3 million pound decline in Norwegian shrimp imports. Consequently, if it is assumed that (1) Alaskan, Canadian, and West Coast IQF shrimp is not exported from the region, and (2) Norwegian shrimp are consumed in West Coast markets, the total supply of IQF shrimp declined slightly in 1988. Given that the supply decreased, the market equilibrium price would be expected to increase, provided that other factors influencing demand are held constant. However, there may be a significant time lag in the response of market prices to changes in supply. The lower prices paid in 1988 may be due to the cumulative impact of several years of high landings and imports (i.e. an increase in supply) during the mid-1980's.

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Table 1 - Statistical subunits for the West Coast pink shrimp population.

Subunit Name	State	PMFC Data Series Statistical Area
Destruction Island	Washington	72
Grays Harbor	Washington	74
Willapa	Washington	75
Northern Oregon	Oregon	82, 84
Coos Bay	Oregon	86
Port Orford	Oregon	Northern 25 nautical miles of 88
Southern OR to Northern CA	-	Southern 25 nautical miles of 88 plus 92
Fort Bragg	California	94
Bodega Bay	California	96
Morro Bay	California	98

Source: Draft fishery management plan for the pink shrimp fishery off Washington, Oregon and California, Pacific Fishery Management Council

Table 2 - Poundage (1000 lbs) and exvessel value (1,000 dollars) of pink shrimp landings in California, Oregon, and Washington from 1977-1988.

Year	California		Oregon		Washington		Total	
	lbs	$	lbs	$	lbs	$	lbs	$
1977	15,871	3,609	48,580	11,200	11,803	2,602	76,254	17,411
1978	13,887	3,654	56,666	14,903	12,262	2,967	82,815	21,524
1979	5,183	1,998	29,587	11,340	12,253	4,492	47,023	17,830
1980	3,814	2,152	30,152	16,684	12,661	6,736	46,427	25,572
1981	4,164	2,127	25,924	13,043	10,041	4,920	40,129	20,090
1982	4,514	2,364	18,462	9,289	4,999	2,586	28,005	14,239
1983	1,030	881	6,547	4,656	5,704	4,346	13,381	9,883
1984	1,629	758	4,844	2,148	3,415	1,566	9,888	4,472
1985	3,331	1,171	14,855	5,241	9,122	3,203	27,308	9,615
1986	6,758	3,616	33,884	18,105	17,446	9,259	58,088	30,980
1978-87 Average	6,031	2,233	26,950	10,661	9,971	4,268	42,152	20,072
1987	7,945	5,615	44,595	30,275	15,914	10,621	68,454	46,511
1988	11,237	4,640	41,864	17,150	18,259	7,350	71,360	29,140

Source: State fishery agencies, final published data

Table 3 - West Coast pink shrimp market sample summaries[1], 1987-1988.

Subunit Area	Average Count per Pound					
	Washington		Oregon		California	
	1987	1988	1987	1988	1987	1988
Destruction Island	154.4	147.2	143.2	144.7	-	-
Grays Harbor	131.6	138.5	129.4	140.6	-	-
Willapa	125.0	144.8	-	99.5	-	-
Northern Oregon	-	-	137.1	127.1	-	-
Coos Bay	-	-	116.3	120.3	-	-
Port Orford	-	-	-	-	-	-
Southern, OR Northern CA	-	-	110.2	111.0	119.4	121.2
Fort Bragg	-	-	-	-	109.2	-
Morro Bay	-	-	-	-	66.7	68.0

Source: State fishery agencies

1/ Count-per-pound is a weighted annual average computed from state agency monthly market samples.

Table 4 - West Coast pink shrimp trawl fleet characteristics, 1985-1988.

	1985	1986	1987	1988
Number Landing	118	216	243	236
Size Distribution (Feet)				
Under 30	0	0	0	0
30 - 39	5	9	8	4
40 - 49	27	52	50	48
50 - 59	25	53	62	58
60 - 69	49	76	88	93
70 - 79	11	24	30	29
Over 79	1	2	5	3
Missing	-	-	-	1
Average Length (Ft)	57.7	57.4	58.6	59.7
Average Gross Tons	69.0	69.1	72.1	74.4
Average Net Tons	46.9	47.7	49.3	51.4
Average Horsepower	292.6	293.4	302.5	319.8
Number Home Based per State				
California	24	47	56	56
Oregon	67	135	138	138
Washington	27	34	49	49
Number Landing Out-of-State	47	82	83	70

Source: State fishery agencies

Table 5 - Average gross revenues[1] accruing from West Coast landings of marine fish for pink shrimp trawl vessels by principal species group, 1987-1988.

Vessel's Principal Species	Number of Vessels		Average Gross Revenues ($)	
	1988	1987	1988	1987
Pink Shrimp	156	187	214,724	293,545
Sole, Flatfish, Halibut	25	18	218,100	188,923
Rockfish	18	13	270,066	282,883
Pacific Whiting	5	7	658,342	673,634
Dungeness Crab	21	9	212,731	146,106
Other	8	5	144,175	163,203
All Vessels	234	239	225,752	286,742

1/ Values converted to 1986 dollars.

Table 6 - Average gross revenues[1] accruing from West Coast landings of marine fish for pink shrimp trawl vessels by length class, 1987-1988.

Size Class (feet)	Number of Vessels		Average Gross Vessels ($)	
	1988	1987	1988	1987
Under 40	7	10	95,243	103,962
41 - 50	62	68	167,894	199,883
51 - 60	45	49	207,366	273,362
61 - 70	96	85	258,584	371,216
71 - 80	20	24	324,965	339,289
Over 80	4	3	273,732	373,640

1/ Values converted to 1986 dollars.

Table 7 - Concentration of pink shrimp landings among Washington, Oregon, and California pink shrimp trawl vessels in 1987.

No. of Vessels	% of Fleet	Landings (mt)	Concentration of Landings (%)
23	9.6	7,636.2	25.3
48	20.1	14,163.8	46.8
72	30.1	19,352.7	64.0
95	39.7	22,902.7	75.7
119	49.8	25,662.0	84.9
144	60.2	27,823.5	92.0
168	70.3	29,120.7	96.3
191	79.9	29,800.4	98.6
216	90.4	30,158.6	99.7
239	100.0	30,233.4	100.0

Source: PacFIN research database

Table 8 - Concentration of pink shrimp landings among Washington, Oregon, and California pink shrimp trawl vessels in 1988.

No. of Vessels	% of Fleet	Landings (mt)	Concentration of Landings (%)
23	9.8	7,737.1	24.2
46	19.7	14,266.0	44.6
70	29.9	19,735.0	61.7
93	39.7	24,106.4	75.4
117	50.0	27,637.0	86.4
141	60.2	29,792.8	93.2
164	70.0	31,080.7	97.2
187	79.9	31,727.8	99.2
211	90.2	31,932.3	99.9
234	100.0	31,976.0	100.0

Source: PacFIN research database

Table 9 - Alaskan and Canadian landings (million pounds) of pink shrimp, 1984-1988.

Year	Alaska	Canada (B.C.)
1984	9.5	2.0
1985	4.2	3.0
1986	4.7	2.2
1987	2.0	4.7
1988	2.1	4.1

Source: Pacific Fishing Magazine - 1989 Yearbook

Table 10 - Imports of Norwegian peeled, other fresh/frozen shrimp into the United States, 1984-1988.

Year	Quantity (pounds)
1984	12,841,000
1985	15,865,000
1986	4,760,000
1987	4,040,000
1988	713,000

Source: U.S. Department of Commerce, Bureau of Census